DI389–03

DTC	P0300	Random/Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

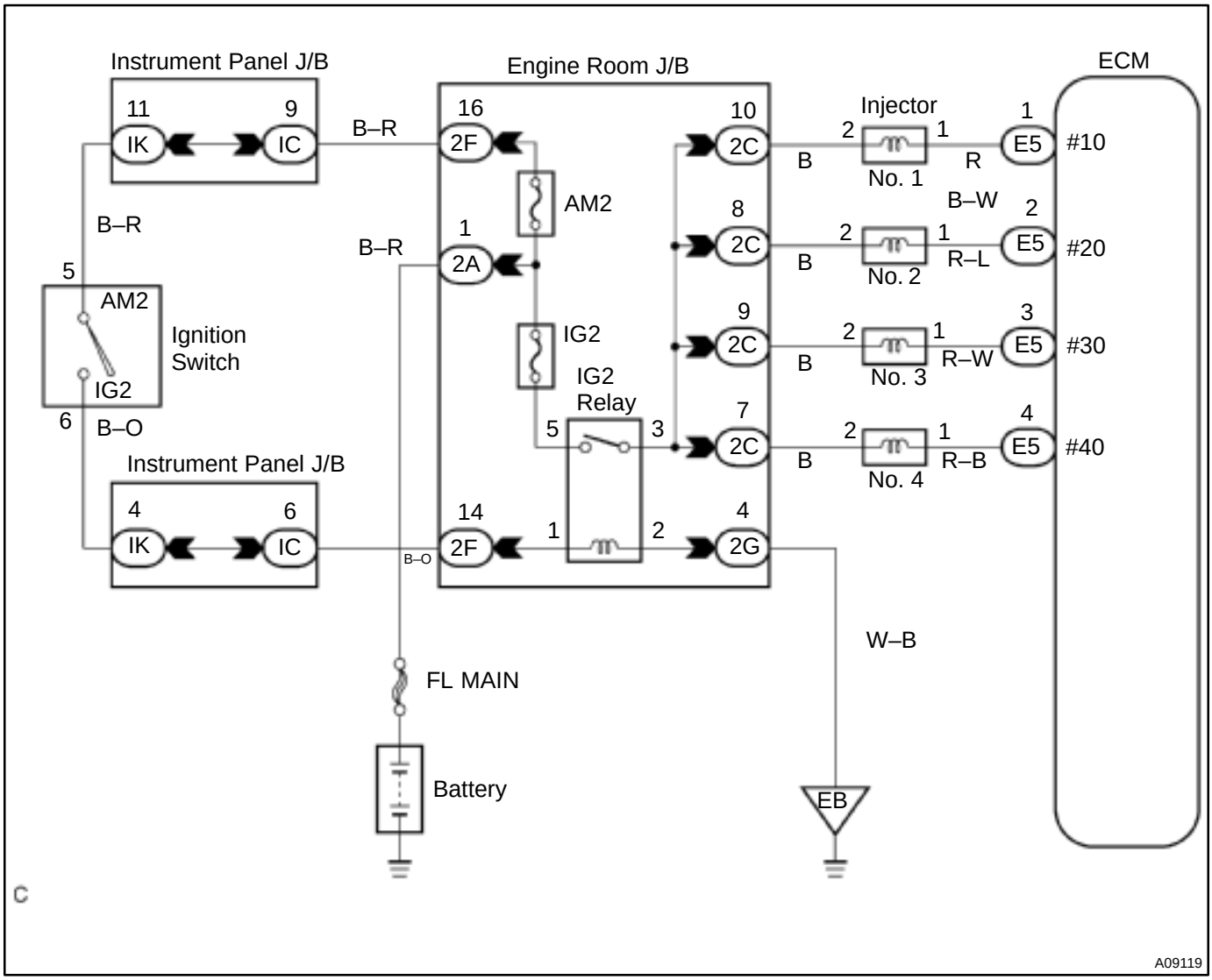
CIRCUIT DESCRIPTION

Misfire: The ECM uses the crankshaft position sensor and camshaft position sensor to monitor changes in the crankshaft rotation for each cylinder.
The ECM counts the number of times the engine speed change rate indicates that misfire has occurred. And when the misfire rate equals or exceeds the count indicating that the engine condition has deteriorated, the MIL lights up.
If the misfire rate is high enough and the driving conditions will cause catalyst overheating, the MIL blinks when misfiring occurs.

DTC No.	DTC Detecting Condition	Trouble Area
P0300 P0301 P0302 P0303 P0304	Misfiring of random cylinders is detected during any particular 200 or 1,000 revolutions For any particular 200 revolutions for the engine, misfiring is detected which can cause catalyst overheating (This causes MIL to blink)	• Open or short in engine wire • Connector connection • Vacuum hose connection • Ignition system • Injector • Fuel pressure • Manifold absolute pressure sensor • Engine coolant temp. sensor • Compression pressure • Valve clearance • Valve timing • VVTL system (Locker arm) • ECM

HINT:
When the 2 or more codes for a misfiring cylinder are recorded repeatedly but no random misfire code is recorded, it indicates that the misfires were detected and recorded at different times.

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN

(a) Connect the TOYOTA hand–held tester or OBD II scan tool.
(b) Record DTC and the freeze frame data.
(c) Use the TOYOTA hand–held tester to set to Check Mode (See page DI–3).
(d) Drive the vehicle several times with the engine speed, load and its surrounding range shown with ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the data list. If you have no TOYOTA hand–held tester, turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again.

HINT:
In order to memorize DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the data list for the following period of time.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1000 rpm	3 minutes or more
2000 rpm	1 minute 30 seconds or more
3000 rpm	1 minute or more

(e) Check whether there is misfire or not by monitoring DTC and the freeze frame data. After that, record them.
(f) Turn ignition switch OFF and wait at least 5 seconds.

INSPECTION PROCEDURE

HINT:

- If is the case that DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame data records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- When the vehicle is brought to the workshop and the misfire is not occurred, misfire can be confirmed by reproducing the condition or freeze frame data. Also, after finishing the repair, confirm that there is no misfire. (See the confirmation driving pattern)
- When either of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is besides the range of ±20%, there is a possibility that the air–fuel ratio is inclining either to ”rich” (–20% or less) or ”lean” (+20% or more).
- When COOLANT TEMP in the freeze frame data is less than 80˚C (176˚F), there is a possibility or misfire only during warming up.
- In the case that misfire cannot be reproduced, the reason may be because of the driving with lack or fuel, the use of improper fuel, a stain of ignition plug, and etc.

1	**Check wire harness, connector and vacuum hose in engine room.**

CHECK:

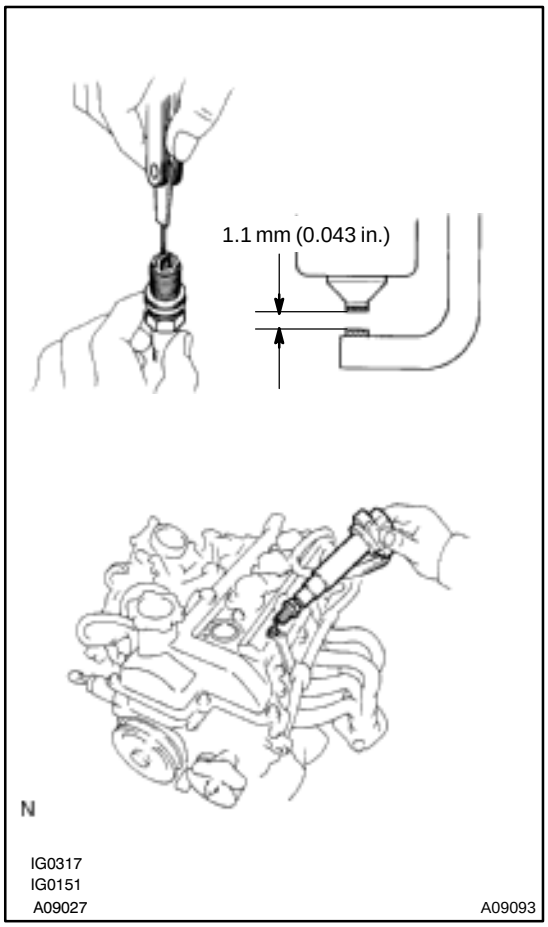
(a) Check the connection conditions of wire harness and connector.

(b) Check the disconnection, piping and break of vacuum hose.

NG → **Repair or replace, then confirm that there is no misfire (See the confirmation driving pattern).**

OK

2	Check spark plug and spark of misfiring cylinder.



PREPARATION:
(a) Disconnect the high–tension cord.
(b) Remove the spark plug.

CHECK:
(a) Check for carbon deposits on electrode.
(b) Check electrode gap.

OK:

(b) No large carbon deposit present.
Not wet with gasoline or oil.
(c) Electrode gap: 1.1 mm (0.043 in.)

PREPARATION:
(a) Install the spark plug to the high–tension code.
(b) Disconnect the injector connector.
(c) Ground spark plug.

CHECK:
Check if spark occurs while engine is being cracked.

NOTICE:
To prevent excess fuel being injected from the injectors during this test, do’nt crank the engine for more than 5 – 10 seconds at a time.

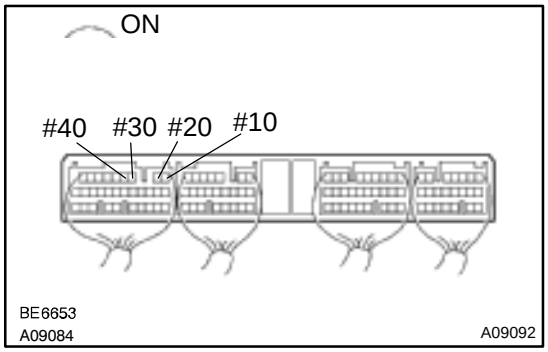
OK:

Spark jumps across electrode gap.

NG	Replace or check ignition system (See page IG–1).

OK

3	Check voltage of ECM terminal for injector of failed cylinder.



PREPARATION:
(a) Remove the ECM cover.
(b) Turn the ignition switch ON.

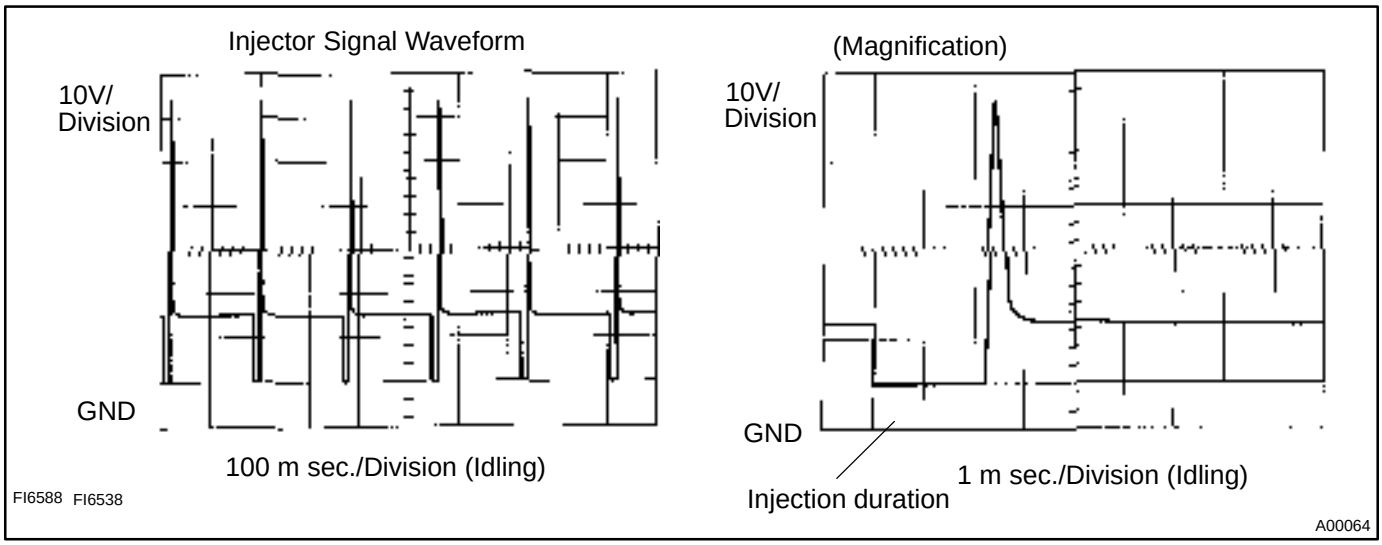
CHECK:
Measure voltage between applicable terminal of the ECM connector and body ground.

OK:

Voltage: 9 – 14 V

Reference: INSPECTION USING OSCILLOSCOPE
INJECTOR SIGNAL WAVEFORM
With the engine idling, measure between terminals #10 ~ #40 and E01 of the ECM connector.

HINT:
The correct waveforms are shown.



OK → Go to step 5.

NG

4	Check resistance of injector of misfiring cylinder (See page SF–18).

NG → Replace injector.

OK

Check for open and short in harness and connector between injector and ECM (See page IN–30).

5	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter.

OK

6	Check injector injection (See page SF–22).

NG → Replace injector.

OK

7	Check mass air flow meter and engine coolant temp. sensor (See page SF–31, SF–63).

NG → Repair or replace.

OK

Check compression pressure, valve clearance valve timing and locker arm (See page EM–3, EM–4, EM–22, EM–48).